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>> Version of Record - Nov 1, 2002

What is This?

# The Use of Technology in the Digital Workplace: A Framework for Human Resource Development

Angela D. Benson
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**The problem and the solution.** The advancement of technology in the global workplace is having a profound impact on the roles of human resource development (HRD) professionals. In the past, technology in HRD was primarily educational media used to support training. Current forms of sophisticated technology, coupled with the expanded role of HRD in the global organization, are now used by HRD professionals to support learning at work, enhance job performance, and facilitate organizational development and change. This chapter presents a conceptual framework for thinking about the role of technology in the digital workplace and highlights the challenges faced by HRD professionals in promoting individual and organizational learning and performance improvement.

The convergence of the information age and the technology revolution on shop floors, offices, and boardrooms of the global workplace has changed the nature of work and the roles that human resource development (HRD) professionals play in ensuring the effective performance of organizations, people, and processes. This has led to workplace changes that range from mechanical to computerized, information based to knowledge based, individualized to team based, and hands-on to minds-on. Increased skill levels are required to maintain complex equipment, and there is an increased need for knowledge workers who possess high-level mental skills that involve symbolic and abstract thinking (Grubb, 1984). As stated by Malhotra (1998), "knowledge workers need to be facile in the applications of new technologies to their business contexts. Such understanding is necessary so that they can delegate 'programmable' tasks to technologies to concentrate their time and efforts on value-adding activities that demand creativity and

innovation" (p. 19). Management strategies also have changed in recent years due to the increased use of just-in-time processes, statistical process control, participative management techniques, and a greater emphasis on teamwork. Professionals, managers, technicians, care and service providers, and general laborers are now faced with increased responsibility because of the decentralization of decision making and reorganization of work structures around semiautonomous, task-oriented teams (Reich, 2000). The impact of technology on the workplace was highlighted in a study by the U.S. Department of Labor more than a decade ago, which stated that employees in the new workplace must (a) know how to learn, (b) be able to apply problem-solving skills to overcome barriers that arise in new situations, and (c) think creatively as they cope with new challenges (Johnston & Packer, 1987). This trend continues today, as employers search for people who possess innovative and creative skills in producing and marketing new products and services to consumers (Friedman, 1999). Although the global economy and the technological workplace call for an increased role for highly skilled employees, current projections indicate that the majority of new jobs in the early years of the 21st century will require either low-level skills (Kincheloe, 1999) or only work-related training (Hecker, 2001). This suggests a widening dichotomy between highly skilled workers and those employed in routine jobs (Reich, 2000), which presents new and difficult challenges for HRD professionals.

HRD professionals were, at one time, content with providing training solutions to performance problems but now must provide a wider range of services by selecting the best solution among a host of interventions, with training being only one option and, more often than not, the least attractive option. Fortunately, the information age and the technology revolution have brought forth an evolving and increasing set of information technology (IT) tools that HRD professionals can use to carry out their new roles in the workplace. The Internet and related Web-based technologies are the driving forces behind many of the most recent IT tools added to the HRD arsenal. These tools range from simple e-mail to complex enterprise-wide information processing systems. This chapter presents a conceptual framework for thinking about the role of technology in the digital workplace and highlights the challenges faced by HRD professionals in promoting individual and organizational learning and performance improvement.

## The Digital Workplace

The digital workplace is built around employees with computers and Internet access. According to the Department of Commerce (2002), as of September 2001, almost 57% of the 115 million employed workers age 25 years and older (65 million) used a computer at work. Of those workers, 74% (48 million) also have Internet access. The resulting 41.7% of the total adult

workforce with computers and Internet access at work in 2001 reflects a marked increase from the 26.7% reported in 2000.

Internet access is more likely to be found in some areas of the workplace than in others. The Department of Commerce (2002) found that 80.5% of workers in managerial and professional specialty occupations have at-work Internet access, closely followed by 70.5% of workers in technical, sales, and administrative positions. Conversely, only about 20% of the workers classified as operators, fabricators, and laborers and those working in occupations categorized as farming, forestry, and fishing have Internet access. It is not clear whether these data suggest that those occupations with less Internet access cannot benefit from the Internet or that little work has been done to determine what performance improvements computers with Internet access could provide (Department of Commerce, 2002). These numbers do suggest a relationship between Internet access in the workplace and level of education. The median education level of those employed in occupations with high proportions of Internet access is a college degree, or at least some college experience, whereas the median education level for those employed in occupations with low Internet access is a high school diploma (Department of Commerce, 2002).

The differences in Internet access across occupational categories affects the distribution of Internet access by gender. Because women tend to be members of the managerial and professional occupational categories more than the laborer and fishing categories, the proportion of women who use a computer at work exceeds the proportion of men by a 62% to 51% margin (Department of Commerce, 2002). Further analysis shows that even though men and women may both have computer and Internet access at work, women trail in their use of Internet technology in the workplace (Cox, 2002). Women tend to use their networked computers for word processing–related activities and sending e-mail, whereas men tend to use the Internet for more advanced activities such as work-related Web searches for specific information to complete a task (Cox, 2002).

How do at-work Internet users compare with all Internet users? Interestingly, 39% of all Internet users have access at both home and work, whereas 49% have access only at home, 8% have access only at work, and the remaining 4% have access in other places such as school or a local library (Horrigan & Rainie, 2002). According to NetRatings, Inc. (2001a), at-work Internet access accounted for nearly 14% of all Web access in January 2001, whereas home Internet access comprised 58%.

Internet access also varies by company size. Jarboe (2002) cites the integration of data networks, including the Internet, into the business practices of large corporations as a key factor contributing to the economic boom of the 1990s. Unfortunately, smaller businesses lacked access to the technologies that these large corporations used to streamline their operations, increase

their productivity, and help the economy grow (Jarboe, 2002). International Data Corporation's 1999 Small Business survey found that many small businesses were unable to capitalize on the new technologies because they lacked the time, money, expertise, and broadband access needed to do so in a timely and strategic manner (Twist, n.d.). In 2002, only 10% of smaller companies have access to high-speed, high-capacity data networks (Jarboe, 2002).

## Information Technology Tools in the Digital Workplace

Although the impact of the Internet is not an issue for every worker, access has changed the lives of those who have it. The status of the Internet is shifting from "being the dazzling new thing to being a purposeful tool that Americans use to help them with some of life's important tasks" (Horrigan & Rainie, 2002, p. 2). At-work Internet users appear to be moving beyond simple e-mail to integrated use of the Internet to complete their job tasks (NetRatings, 2001b). At-work Internet users were much more likely in 2001 to access the Internet for work-related research than in 2000, and 45% of those who have Internet access at work say that the Internet helps them do their jobs (Horrigan & Rainie, 2002).

The changes invoked by Internet and Web-based IT tools go beyond the individual worker; they affect the entire work domain of the HRD professional. From a global HRD perspective, the uses of IT tools in the digital workplace fall into three categories: learning mediated by technology, performance enhancement, and organizational development and change. Figure 1 portrays a conceptual framework of IT in the digital workplace, with each side of the triangle representing one of the three major categories of importance to HRD. The various IT tools in the digital workplace, which are situated in the interior of the triangle, include technologies such as e-mail, mailing lists, bulletin board discussion lists, newsgroups, Internet search engines, and Web databases. The triangular representation of the digital workplace and its influence on HRD indicate that each IT tool may have use in each of the three categories represented by the triangle's sides. For example, a simple tool like e-mail as well as a more complex tool like a Web database can be used for learning at work, job task completion, and organizational decision making.

### Learning Mediated by Technology

Learning at work, a familiar domain of HRD, increasingly is becoming a Web-based activity. The U.S. market for Web-based corporate training,
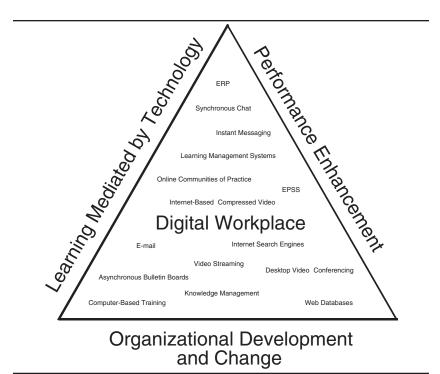
**FIGURE 1:   Information Technology Tool Use in the Digital Workplace**
*Note:* EPSS = electronic performance support systems.

which was $550 million in 1998, is expected to increase to $11.4 billion by 2003 (Moe & Blodgett, 2000). IT tool use in this category supports both formal training interventions and informal learning activities. E-mail, mailing lists, bulletin board messaging systems, and streaming media applications are a few of the IT tools being used to support learning at work. These tools are used either individually to provide formal learning opportunities or as an integrated set of tools in the form of a learning management system to provide systemwide learning through large-scale initiatives. The formal learning activities that are supported by these tools can range from short orientation workshops to extensive multiday courses. Increasingly, aspects of formal classroom training and e-learning are being merged into hybrid learning environments, known as a blended learning approach, which contain a combination of face-to-face and Web-based formats.

The trend toward Web-based e-learning has resulted in changes in the instructional design for formal training as well as the role that trainers must assume to design and provide this type of training. Traditionally, systematic models of instructional design have been used to direct the design and development of training interventions. It is not surprising that these same models

are being applied to the design and development of Internet- and Web-based training, which leads to the replication paradigm, in which Web-based training is a direct replication or copy of the materials and strategies used in traditional classroom instruction (Lee, Owens, & Benson, 2002 [this issue]). Such an approach fails to take advantage of the unique capabilities and potential of Web-based learning environments (Johnson & Aragon, 2002). Changes are needed in the way traditional instructional design models are applied to create Web-based learning environments. Although designers of Web-based learning environments can use the familiar ADDIE (analysis, design, development, implementation, evaluation) model of instructional design, the model must address new questions to be effective (Lee et al., 2002 [this issue]). For example, it is critical that the analysis phase of instruction design go beyond the typical learning and task analysis steps to include a thorough analysis of the learners' technology skills and a determination of the availability of a technology infrastructure that can support a Web-based training program.

Just as the process of designing instruction has to be modified to accommodate the unique characteristics of Web-based instruction, the role of the HRD professional who implements this new form of instruction also has changed. The model of the stand-up trainer no longer applies in this new environment. The "sage on the stage" and the "guide on the side" both give way to the "electronic facilitator" or eTrainer. New roles and competencies are needed by the eTrainer who must deliver instruction using a wide range of ever-changing Web-based technologies (Aragon & Johnson, 2002 [this issue]). For example, these new roles require greater skill in areas that are not typically within the domain of HRD professionals, including skills in the use of technology, technology management, troubleshooting, graphic design, and media production. This presents a challenge for HRD professionals to gain new skills to add to their repertoire of expertise that already is broad in scope.

In addition to changing the nature of instructional design and formal learning initiatives, the Internet and related Web-based technologies have greatly enhanced employee opportunities for informal learning (Dennen & Wang, 2002 [this issue]). Informal learning is motivated by personal or individual need and it results through direct interaction with others and the environment (Marsick & Watkins, 2001). The availability of computers with Internet access on the desks of many workplace employees literally has brought a world of informal learning to the fingertips of many employees. Employee-initiated informal learning may be as simple and unstructured as conducting a Web search to obtain background knowledge to complete a specific job task or something as complex and structured as participation in an online community of practice. The full potential of the Internet to support informal learning is yet to be realized.

### Performance Enhancement

Increasingly, Internet and Web-based technologies are being used to support and enhance job performance. Computer-based performance enhancing tools evolved from a collection of closely related fields and technologies, including human performance technology, electronic performance support systems (EPSS), computer-supported collaboration, technical communications, and electronic publishing (Sherry & Wilson, 1996). These types of technologies are used to capture and manage existing institutional knowledge, support job performance by providing electronic performance support, and facilitate the exchange of work-related information through networked communication systems. The goal of technology in this area is to enhance individual and organizational performance by providing the knowledge, tools, and support systems needed to get the job done.

Participative decision making, at one time considered the function of managers, is becoming an organization-wide activity. Employees at all levels and in all types of organizations are making decisions that affect their organization's bottom line and future direction. This sharing of decision-making responsibilities across organizational hierarchies and structures has been facilitated by the use of Internet- and Web-based technologies. Knowledge management (KM) is a systematic process of capturing various forms of knowledge and experiences for later use to enhance decision making. KM is now considered a necessity for organizations. Given the transient nature of employees, it is critical that organizations capture and manage institutional knowledge to prevent the knowledge loss that occurs when employees leave the organization. Using new IT tools such as corporate intranets, virtual community collaboration tools, data warehousing and data mining tools, and Web-based business intelligence systems, organizations are improving their ability to collect and disseminate information needed for decision making and performance enhancement across all levels of the organization (Ardichvili, 2002 [this issue]).

EPSS include online job aids, support tools, and information systems designed to assist users with workplace performance (Stevens & Stevens, 1996). These performance enhancement tools evolved from expert systems: knowledge-intensive computer programs that relied on human expertise in the form of heuristics to solve difficult problems (Harmon & King, 1985). Web-based EPSS are now being used to improve worker performance in many areas, from maintenance workers in the military to medical care providers in the health industry. These powerful EPSS provide HRD professionals with new tools to address an expanded set of problems by providing better ways to offer support, references, courses, and collaboration (Gery, 2002 [this issue]).

Although performance support is an important benefit of IT in the workplace, it provides much more than procedural job and task support. IT is a

social tool that is essential for effective communication and collaboration. IT tools such as e-mail, instant messaging, discussion lists, and video-conferencing have changed the nature of workplace communication and collaboration (Schrum & Benson, 2002 [this issue]). These tools allow workers to engage in workplace interactions without being physically present in the workplace. They allow communication and collaboration to occur at a distance, rather than requiring employees who need to work together to be in the same place at the same time. Virtual teams, electronic workgroups, and enhanced teleworking are a few of the communication and collaboration arrangements made possible by the new IT tools.

### Organizational Development and Change

Change is an ongoing process as organizations transform themselves with flatter organizational structures, more cross-unit collaboration, and bottom-line accountability at the unit level. This type of change can be successful only if it is accompanied with a considerable amount of developmental activity for those who will either lead the change or be affected by it. IT is now able to provide tools to support the organization and its people as they develop and change.

To be successful in any change initiative, organizations must adopt the perspective of organization development (OD) as a data-driven approach to organizational change (Waclawski & Church, 2002). Direct attention to the role of Internet- and Web-based technologies in OD must occur in three areas: data-based assessment tools and techniques, team building, and management/employee development (Church, Gilbert, Oliver, Paquet, & Surface, 2002 [this issue]). This requires that organizations develop employees who are comfortable with technology and have access to the data and tools they need to support change.

Organizations also must make decisions about the effectiveness of their use of Internet- and Web-based technology tools in their operations (Phillips & Phillips, 2002 [this issue]). The use of technology for technology's sake is not a viable option. Careful assessment of the decisions that organizations make concerning IT application and use, as well as how those decisions affect the organization's bottom line, must be conducted. Given the limitations of traditional approaches to evaluation, it is clear that new measures are needed to adequately capture the impact of the use of IT tools in organizational development and change.

Although IT tools have affected the workplace in many positive ways, there is yet considerable uncharted ground for HRD professionals to explore in their quest for increased workplace performance. HRD professionals have a tremendous opportunity to use IT tools to enhance learning, job performance, and organizational decision making. However, as with any inno-

vation, there are numerous opportunities to be seized and other opportunities that will be missed by the HRD professional. Bolstorff's (2002 [this issue]) vision for how and where HRD professionals can use the new IT tools in the future to further enhance workplace performance may provide a way to take advantage of the opportunities without succumbing to the challenges.

## IT Challenges for the HRD Professional

Any review of information and learning technologies in HRD would be incomplete without, at least briefly, reflecting on the implications of the diffusion of IT use into the workplace and raising some critical issues of concern to HRD. This summary relies on the treatise by Burbules and Callister (2000), who interpret the spread of IT as a social transformation on par with the invention of the printing press. Shaping the ways of working and living in complex and far-reaching ways, IT affects the social fabric of our world in ways that few technological innovations have. Rather than being a mere technological means to a predefined end, IT needs to be understood as a social environment whose technical features are perhaps the least problematic and best understood. The "implications of new information and communication technologies . . . offer a mixture of transformative possibilities and deeply disturbing prospects . . . as inseparable dimensions of the type of changes these technologies present" (Burbules & Callister, 2000, p. 7). With much writing on IT focused on the technical expediencies and opportunities, critical aspects remain underexplored but need to be surfaced to arrive at a balanced and realistic assessment of plans for action.

One key concern in IT is the issue of access. Even cursory surveys reveal great disparities in the general population related to (a) the use of IT; (b) quality, quantity, and ease of access; and (c) the type of content and information that are accessed (Department of Commerce, 2002). Far from being a democratizing force of equal access to free information for all, social stratification seems to characterize the situation at present, and it can be presumed that the workplace only mirrors this disparity. Variables that determine technical access include the availability of hardware and software; low-cost and fast connectivity; technical and user support, time, and privacy to explore and experiment; and availability of equipment and software upgrades. These resources are not distributed equally among urban and rural populations, large and small organizations, and for-profit and not-for-profit organizations. International comparisons of access to IT yield even greater degrees of disparity. The rapid and accelerating pace of IT innovation and the commensurate need to upgrade and expand equipment continuously are likely to exacerbate the technological divide and threaten to create societies (regional, national, and global) of IT haves and have-nots.

Skills, abilities, and attitudes of the users of IT present another set of variables determining access. Efficient use of IT requires high levels of literacy and technical proficiency in using hardware and software, cognitive skills for searching and retrieving data and making judgments about their truthfulness and usefulness, willingness and ease to interact with computers, and a preference for learning individually with self-direction and self-monitoring. In addition, IT users need continuous retraining to keep pace with changes in hardware and software, time and space for trial-and-error learning, and a preference for learning through reading. Here, again, IT emerges as a specialized tool for a specialized group and has resulted in the exclusion and marginalization of others. We know little about those who have withdrawn from technology, because they do not meet the requirements for effectively operating in IT environments, nor do we have insight into the psychological costs born by those who are required to operate in such technological environments that are antithetical to users' preferences for interacting, learning, and developing.

A third critical issue is related to the extreme range of quality of information presented in IT environments, whether on the Internet, in intranets, in learning/training environments, or in performance situations. Although many excellent IT resources exist, there are a large number of sources that should be characterized, to return to Burbules and Callister (2000), as misinformation, messed-up information, and mostly useless information. Information may be outright false, out-of-date, incomplete, or presented in misleading ways. Information may be hateful, offensive, and potentially damaging and dangerous. It may be poorly organized and presented, and it may be irrelevant and trivial. The ability to discern the quality of information accessible through IT falls, in many instances, to the user, and there are few gatekeepers in this environment.

With much of the writing on IT expounding its potential opportunities and benefits, it is mandatory to maintain a critical stance and a realistic view of the phenomenon. IT—because of its far reach, rapid deployment, and focus on communication and information—represents an evolving social transformation with profound implications and severe challenges and issues. Given the exciting opportunities for teaching and learning in schools, universities, and workplaces, it is important to stay focused on the fact that IT is not a value-neutral instrumental innovation but rather a profound force on our lives. Presently, there are winners and losers in the IT game, there are intended and unintended consequences in IT implementation, and there are ways of working, learning, and developing through IT that are encouraged and those that are discouraged. It is incumbent upon HRD scholars and responsible practitioners to take an objective stance toward IT, recognizing both its promises and its potential for creating negative consequences.

## Conclusion

Almost 42% of workplace employees have access to computers with Internet connectivity. These workers form a growing population of what is known as the digital workplace. The use of the Internet and related Web-based tools that define this new workplace is affecting employee and organizational performance. These tools are shaping the way workers communicate, learn, make decisions, and conduct business. As a result, the Internet and related Web-based technology tools are important to HRD professionals who seek to fulfill their roles as partners in improving workplace performance. This chapter lays a foundation in the HRD literature for the effective use of these technologies and provides a base for further structured inquiry into the use of the technologies to improve individual and organizational performance.

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